Alaska Monitoring Assessment Program (AKMAP) Overview

Douglas Dasher & Terri Lomax
State of Alaska
Department Environmental Conservation

Participating Member
University of Alaska
UAF School of Fisheries and Ocean Science &
Institute of Marine Science
UAA Environmental Natural Resources Institute
Presented at AFE Conference 02/02/09

Clean Water Act

- Drivers
  - Establishing, Reviewing and revising water quality standards (Sec. 303 c)
  - Determining water quality standards attainment (Sec. 303 b)
  - Identifying impaired waters (Sec. 303 d).
  - Identifying causes and sources of water quality impairments (Sections 303 d, 305 b)
    - "Characterize all waters in Alaska"
   - monitor, assess, and report on status and trends of all States waters, including wetlands

Alaska Water Quality Characterization

- How can resource mangers assess water quality?
  - 45,000 miles of coast line
  - 12, 000 rivers and streams
  - Several million lakes
  - 40% of the United States water resources.

Alaska Monitoring & Assessment Program (AKMAP)

- A research program to develop
  - Tools necessary to monitor and assess spatial and temporal trends in national ecological resources.

- Provides resource managers and decision makers with information to assess and protect the ecological condition of our natural resources.

AKMAP (EMAP) State Wide Assessment Status

Environmental Monitoring and Assessment Program
2006 ASSESSMENT SURVEY PLAN AND STATUS
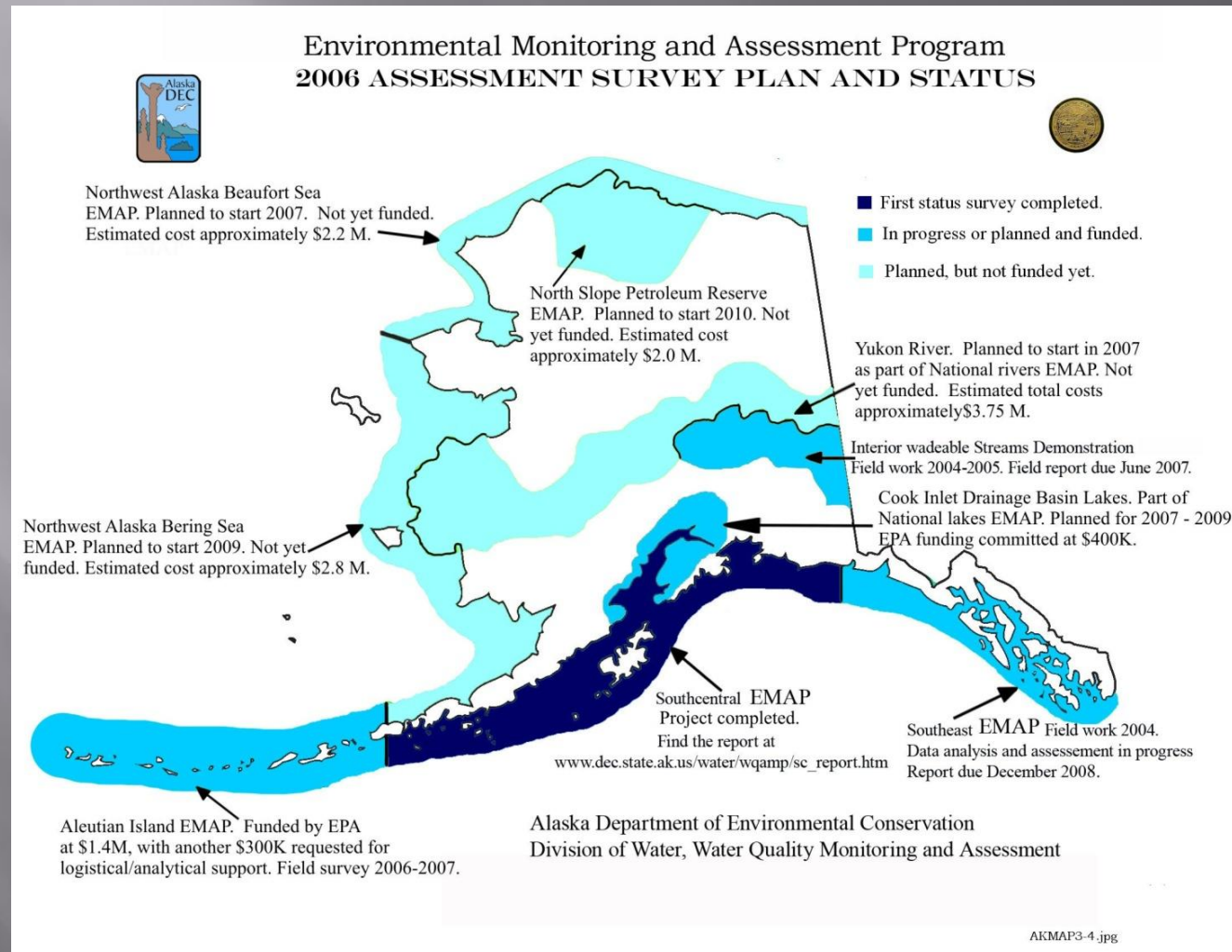
Tanana River Drainage Wadeable Stream Assessment

Prepared by
UAA Daniel Rinella and Dan iel Bogan
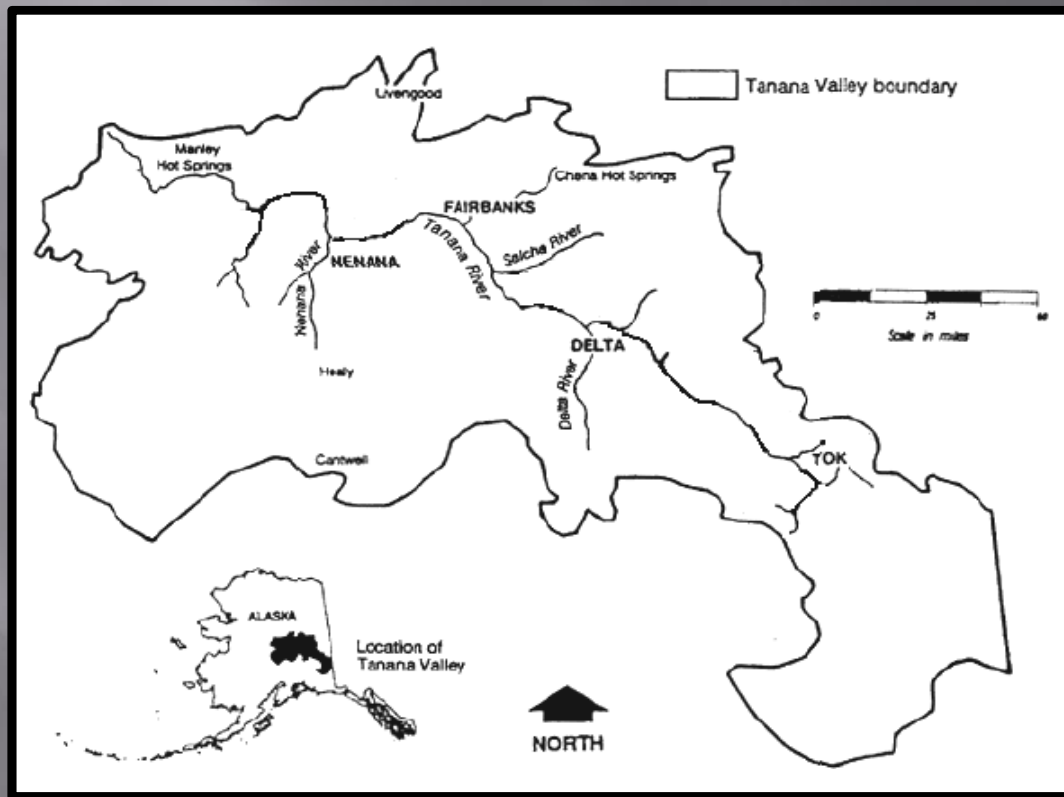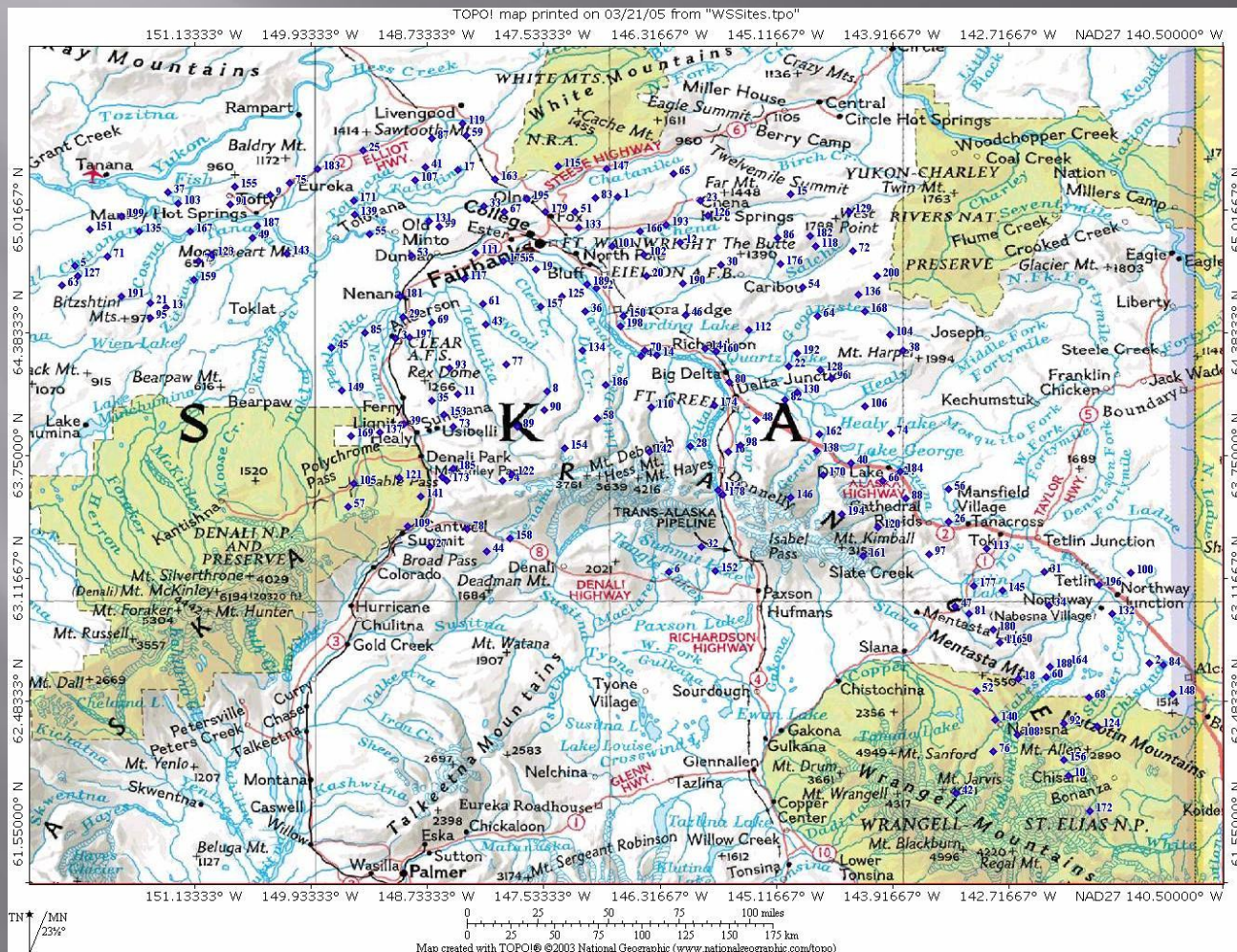&
DEC Douglas Dasher

Location

Figure 1. The Tanana River basin.

# Probabilistic sample sites for the Tanana River basin

General EMAP environmental indicators

- Physicochemical
  - The physical and chemical properties of water directly affect aquatic biota, making them important indicators of environmental conditions.
- Physical habitat
  - Physical habitat includes all physical attributes that influence organisms. Instream and riparian alterations affect stream biota and water quality.
- Biological
  - periphyton standing stock
    - Reflects the biomass of aquatic primary production. Related to the nutrient status and hydrologic stability of streams.
  - macroinveretebrate assemblage
    - Benthic macroinvertebrates live on the bottom of streams and reflect the overall biological integrity of the stream. They are direct measures of aquatic life uses.

Representative stream sites in the Alaska Range ecoregion. Clockwise from upper left: Sites 73, 122 (Big Grizzly Creek), 7 (Moose Creek), and 98 (Till Valley).
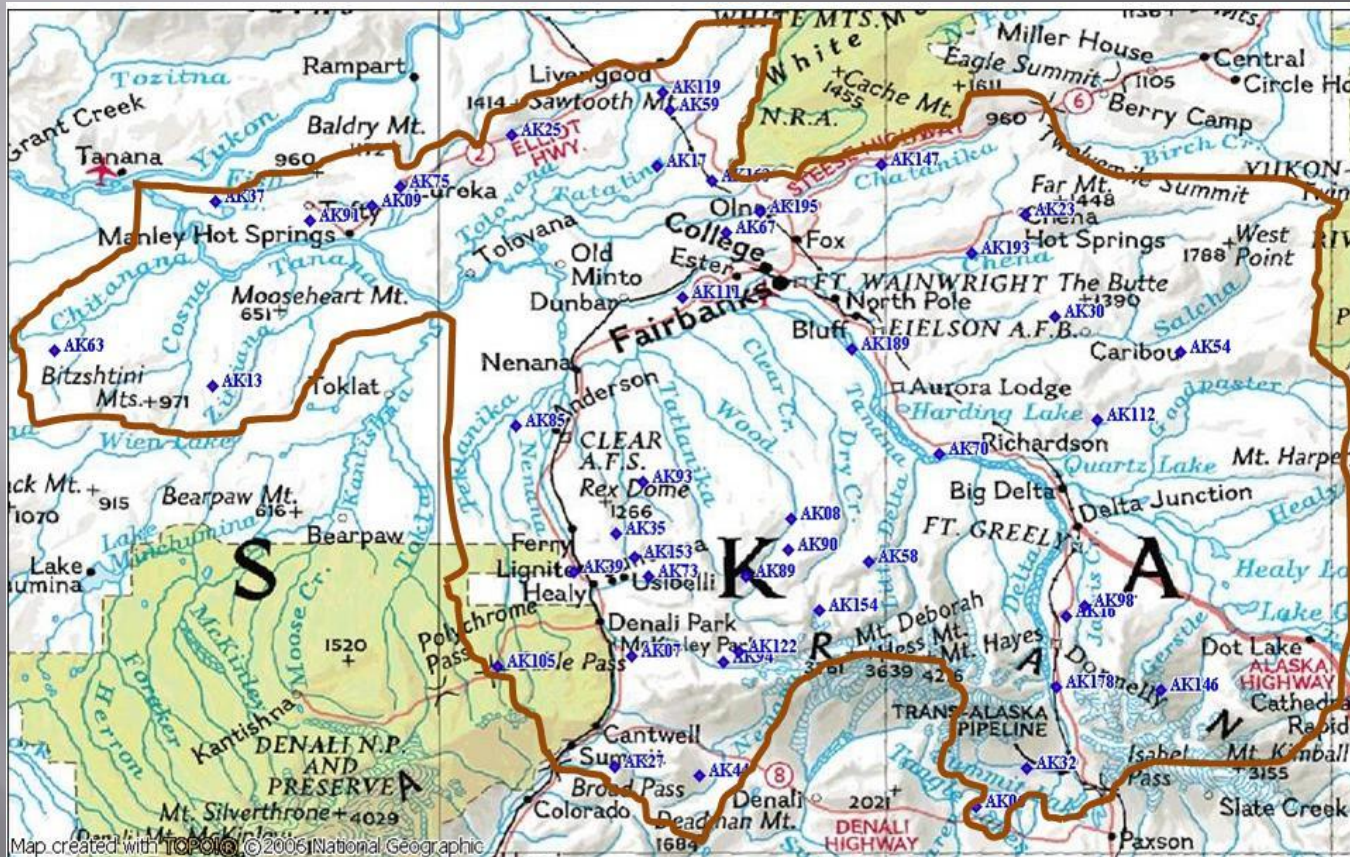
. Representative stream sites in the Tanana-Kuskokwim Lowlands ecoregion. Sites 63 (upper panel) and 85 (lower panel).
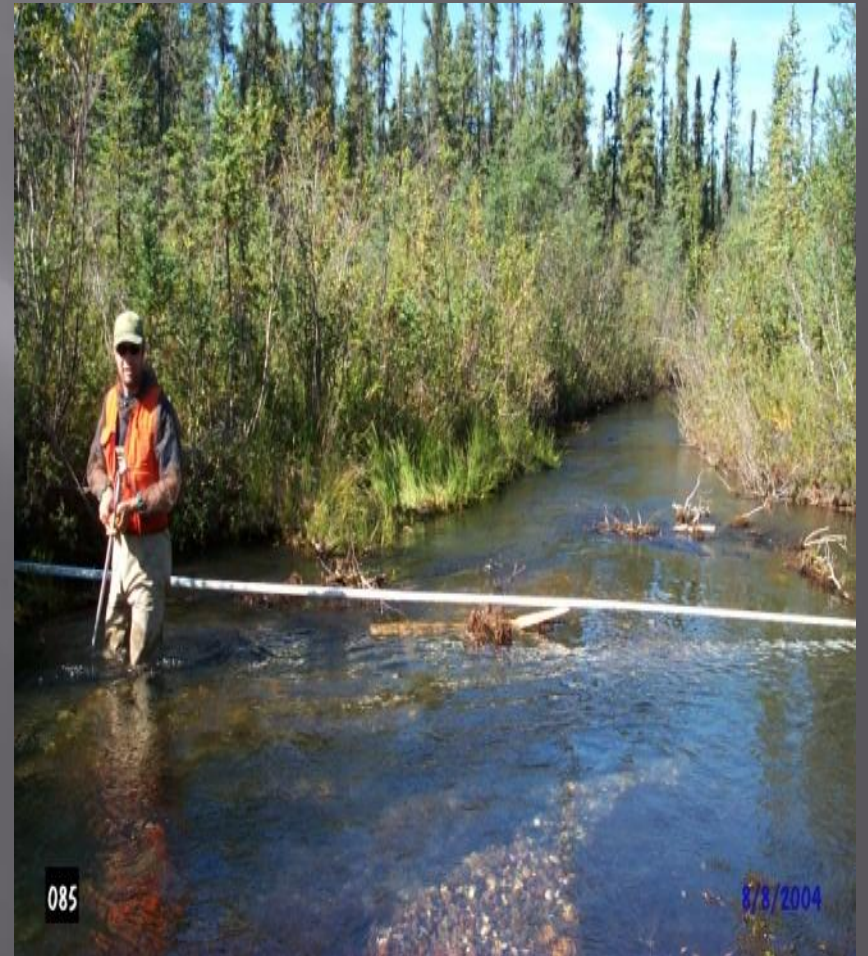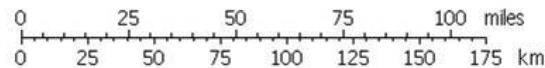
Representative stream sites in the Yukon-Tanana Uplands ecoregion. Clockwise from upper left: Sites 23 (Monument Creek), 54 (Upper Boulder Creek), 17, and 147 (Chatanika River).

Sampled Sites (46)

Cumulative Distribution Function

- A CDF plot shows the cumulative value of an indicator in relation to stream length for the entire population of sites.

- Since our sample sites were drawn randomly from a population of known size, the CDF plots are scaled to indicate the linear distance of Tanana basin wadeable streams corresponding to each percentage.

- The adjacent figure shows that 80% of the target population (or 10,129 km of streams) has an indicator value of less than 700 while 20% (or 2532 km of streams) have an indicator value less than 700.
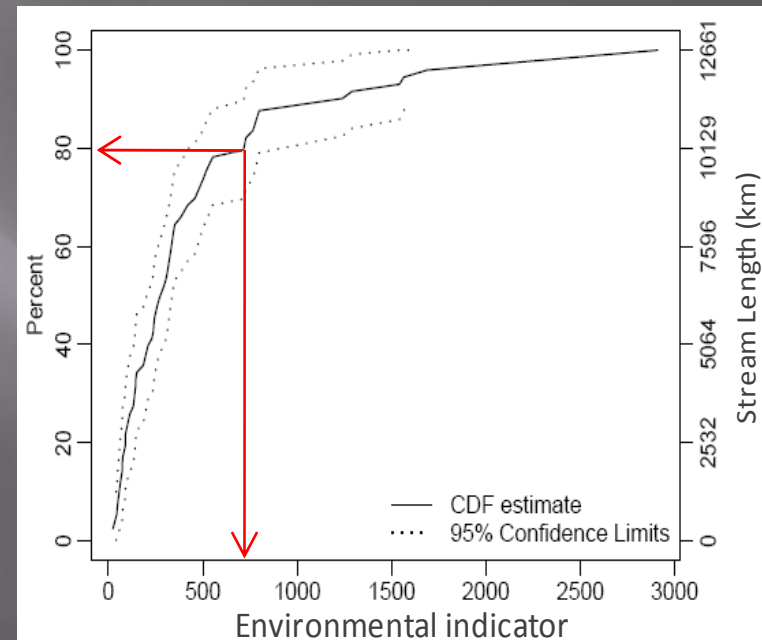

Figure 10. Hypothetical cumulative distribution frequency plot

Physicochemical parameters

- Dissolved Organic Carbon (DOC) is often a major component of the organic matter in freshwater systems. Typical measures for streams range from 1 mg/l for pristine, clear streams to 30 mg/l for blackwater streams (Thurman 1985). Of the 45 streams where DOC was measured, 18 had concentration less than 1 mg/L and three had concentrations over 30 mg/L. The two streams with highest DOC concentrations, sites 59 and 67 with DOC of 38.2 and 51.9 respectively, were not flowing during sampling (i.e., water was present in stagnant pools), which probably contributed to the elevated DOC levels.
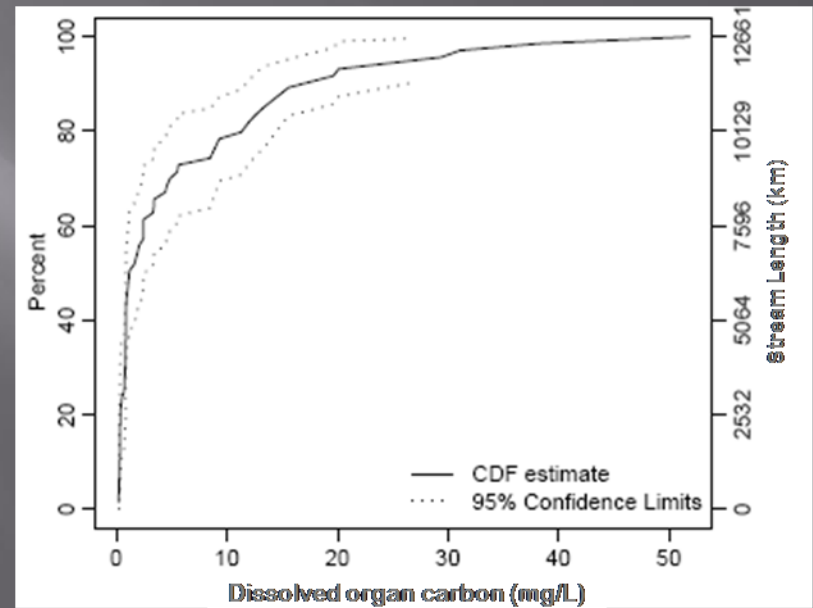
Macroinvertebrate assemblages

- Stoneflies (order Plecoptera) are another group of organisms that are sensitive to human disturbances. Stoneflies were present in 73% of estimated Tanana basin stream km, and comprised at least 9.5% of the macroinvertebrate assemblage in half of the estimated stream km. The mean percent Plecoptera was 15.2%, corresponding closely with the 17.2% reported by Oswood (1989) for this region.
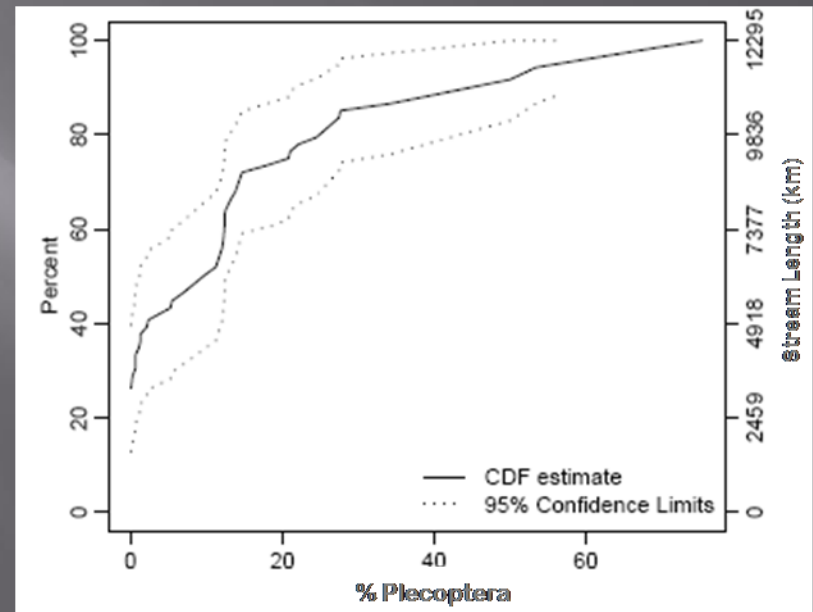
Physical habitat

▫ Riparian canopy (riparian vegetation >5m) was classified into four different cover types: coniferous, deciduous, mixed, and none. Typical coniferous species included both white spruce (*Picea glauca*) and black spruce (*P. mariana*), whereas typical deciduous species included birch (*Betula paperifera*), cottonwood (*Populus* sp.), and alder (*Alnus* sp.). An estimated 47% of the stream km had no riparian vegetation over five meters.
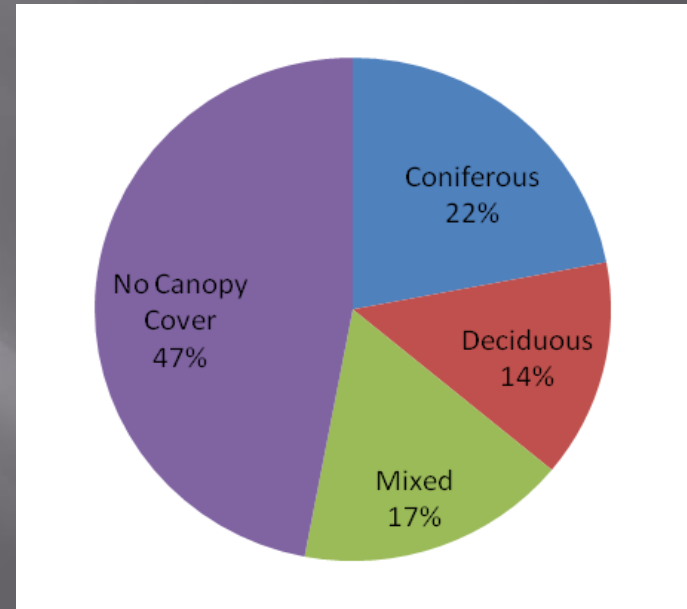
Observed macroinvertebrate functional feeding group composition at Site 35 (McAdam Creek), a placer mined scrubland site.
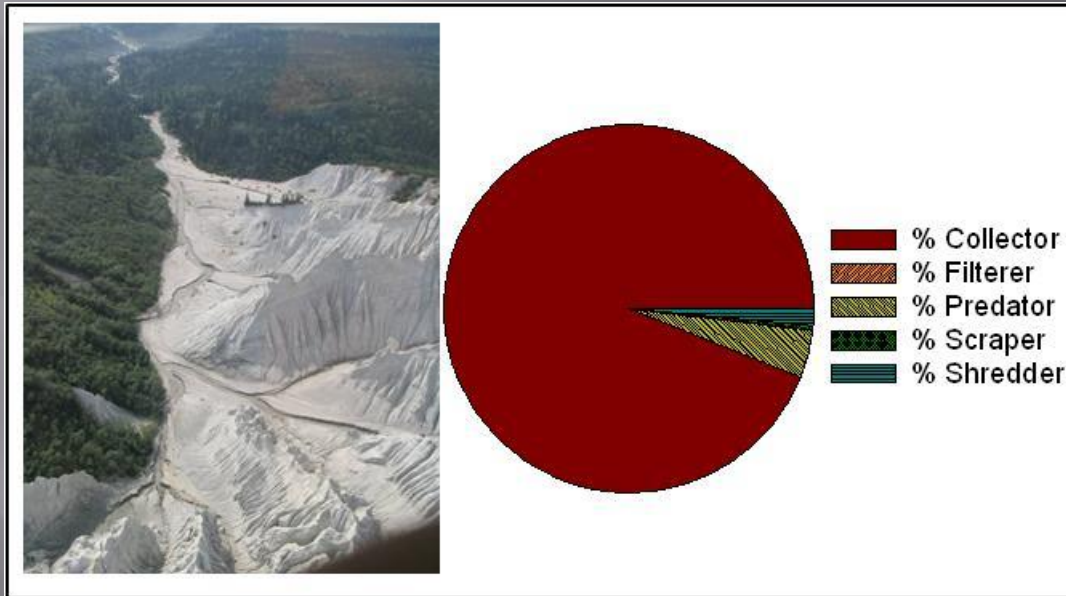
Observed functional feeding group composition at Site 23 (Monument Creek), a burned coniferous forest site.
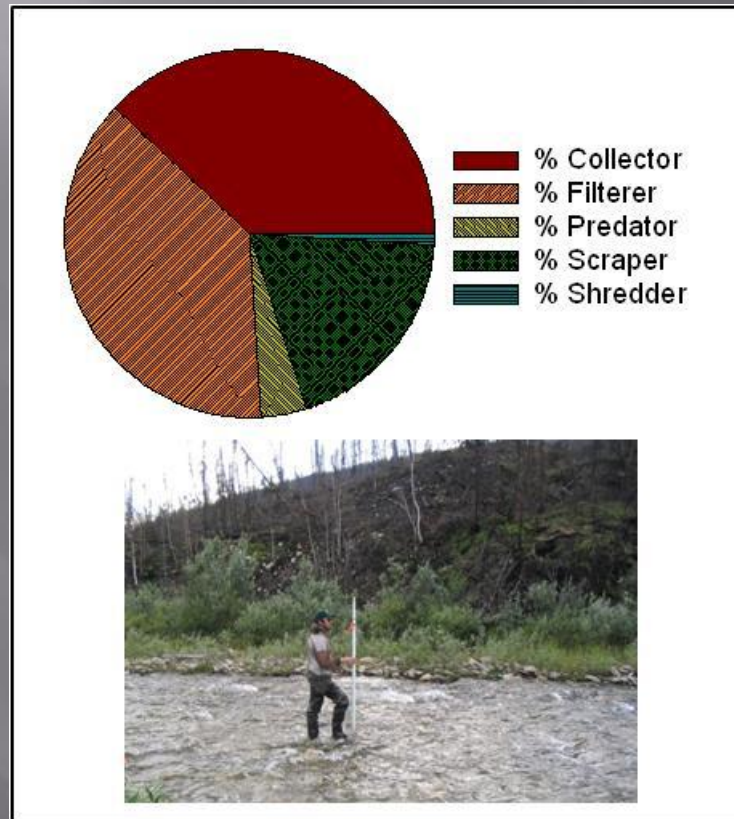
Expected functional feeding group composition (50% credibility interval) for wadeable streams in the 4 dominant vegetation types of the Tanana River basin.
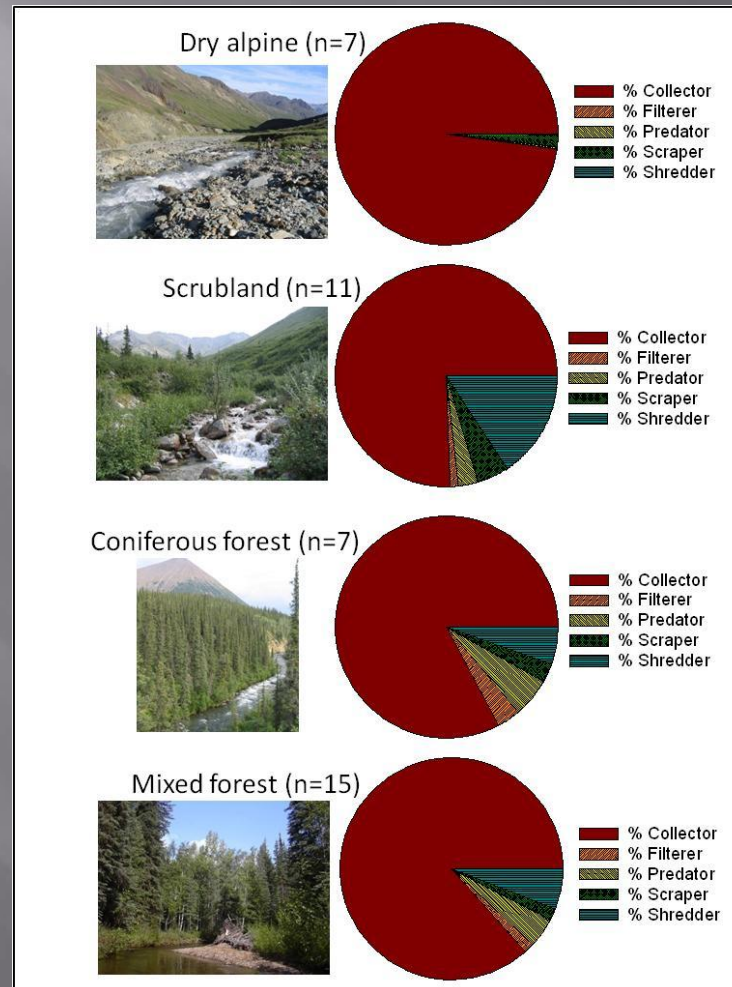
Figure 7. Measuring depth and substrates along a channel transect.

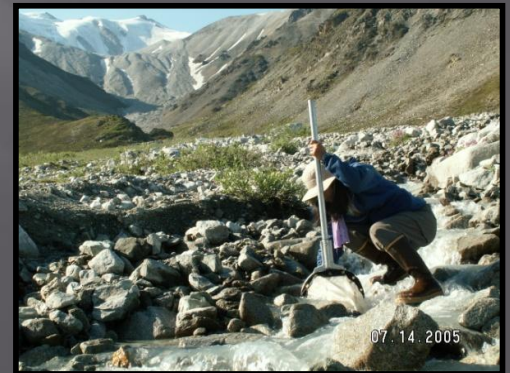Figure 8. Measuring stream discharge.

Figure 9. Sampling benthic macroinvertebrates

Acknowledgments